91602
new 82-10

ontario hydro
research division

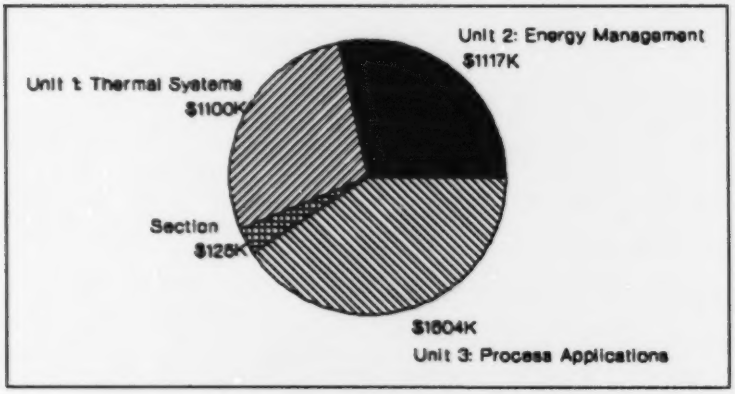
COMPLIMENTARY COPY
Please Credit Ontario Hydro Research if Reproduced in Whole or in Part

TO: DR. D. MILLS
Director of Research

UTILIZATION SECTION - 1990 WORK PROGRAM

This report outlines the 1990 Utilization Section work program and deliverables.

Ontario Hydro, Research Division, Utilization Section
1990 Budget $3,946 K
(includes $332 K contracted out)



Approved by:

A.F. Baljet
Manager
Electrical Research Department

Submitted by:

J.M. Bell
Supervising Engineer
Utilization Section

JMB:djb

job	file	date	report no.
12-871	814.	May 16, 1990	90-125-K

LEGAL NOTICE

This report was prepared by Ontario Hydro and, while effort has been made to assure the accuracy and applicability of the material contained herein, neither Ontario Hydro nor any person acting on its behalf:

(a) makes any warranty, express or implied with respect to the use of any information, apparatus, method or process disclosed in this report or that such use may not infringe privately owned rights; or

(b) assumes any liabilities with respect to the use of, or for damages resulting from the use of, any information, apparatus, method or process disclosed in this report.

Overview Work Programs

Overview - Work Programs

Unit 1: Thermal Systems

1. Program Consulting
2. High Performance Heat Pumps
3. Ground-Source Heat Pumps
4. Burner-Assisted Heat Pumps
5. Demand Control
6. Refrigeration Technologies

Unit 2: Energy Management

1. Program Consulting
2. Advanced Water Heating and Appliances
3. Building Science
4. Heat Recovery

Unit 3: Process Applications

1. Customer Energy Services
2. Drying, Curing, Concentrating
3. Energetics
4. Heating
5. Motive

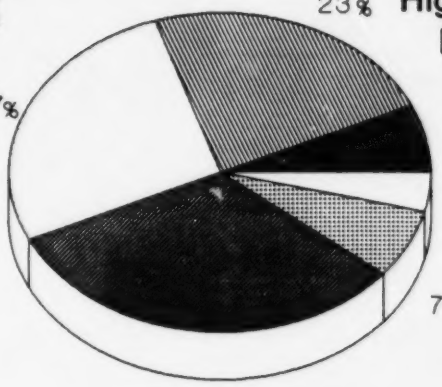
Unit 1

OHRD Utilization Section

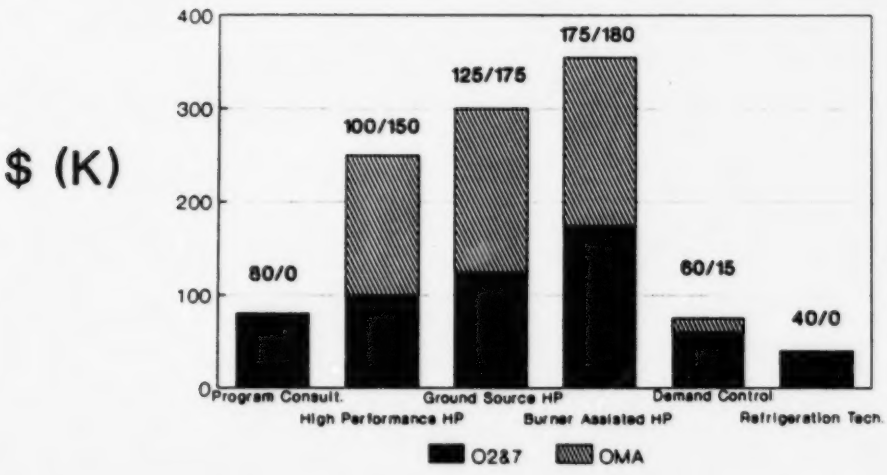
Unit 1 - Thermal Systems
1990 Work Programs

Total Budget $ 1,100,000

Work Effort


23% High Performance Heat Pump
7% Program Consulting
4% Refrigeration Technologies
7% Demand Control
32% Burner Assisted Heat Pump
27% Ground Source Heat Pump

Funding



1990 Work Program and Deliverables

Unit 1: Thermal Systems

TITLE	DELIVERABLE (by year end)	RESPONSIBILITY
1. Program Consulting ($80 K)	• 2 CSA standards - room A/C - air source HP	D.J. Young
	• technical rules to support Programs	F.J. Lenarduzzi Unit
	• trouble shooting	
	• year-end report	D.J. Young
2. High Performance Heat Pumps ($250 K)	• Control - tested boards - demo of defrost algorithm - finished product July 91	S. Yap
	• Air-source HP (benchmark) characteristics for DM (strategist) (measured in 4 houses) - memo with preliminary signature curves	S. Yap
	• Reversing valve fundamental standard (ASHRAE) - test work hired out - Herrick Labs test rig, specif, bakeoff - comparison report	D.J. Young
	• Carrier Hydrotech 2000 - request load charact from Carrier - if not, then D. Cane field trial	S. Yap
	• Ductless HP system tests - Daikin - low-temperature performance - report	D.F. Cuthbert
	• Test Facility Upgrade - automated instrumentation - new calorimeter	D.J. Young
	• Computer aided design capability for HP (using commercially-available products)	D.F. Cuthbert

TITLE	DELIVERABLE (by year end)	RESPONSIBILITY
	• Optimized defrost algorithms - interim report	S. Yap
	• Committees	
	- MEA	F.J. Lenarduzzi
	- IPUHPC	J.M. Bell
	- CEA R&D	D.J. Young
3. Ground-Source Heat Pumps ($300 K)	• GSHP (benchmark) characteristic for demand management - analysis of 27 house monitoring (report)	F.J. Lenarduzzi
	• spiral design guidelines issued	F.J. Lenarduzzi
	• Perfected horizontal DX system	F.J. Lenarduzzi
	• Prototype vertical DX system	F.J. Lenarduzzi
	• GSHP committee re "ice lens"	F.J. Lenarduzzi
4. Burner-Assisted Heat Pump ($355 K)	• BA HP (benchmark) characteristics for DM - 15 house field trial - installation report by end of 1990	D.F. Cuthbert
	• Baseboard heating solution - prototype multi-split (non-air source H.O. System) (heating and cooling system to follow in 1991)	D.F. Cuthbert
5. Demand Control ($75 K)	• Noritzu field test - installation and performance report (with ORTECH)	D.F. Cuthbert
6. Refrigeration Technologies ($40 K)	• Study of Ice Rink Plant Savings Potential (contract out)	D.J. Young

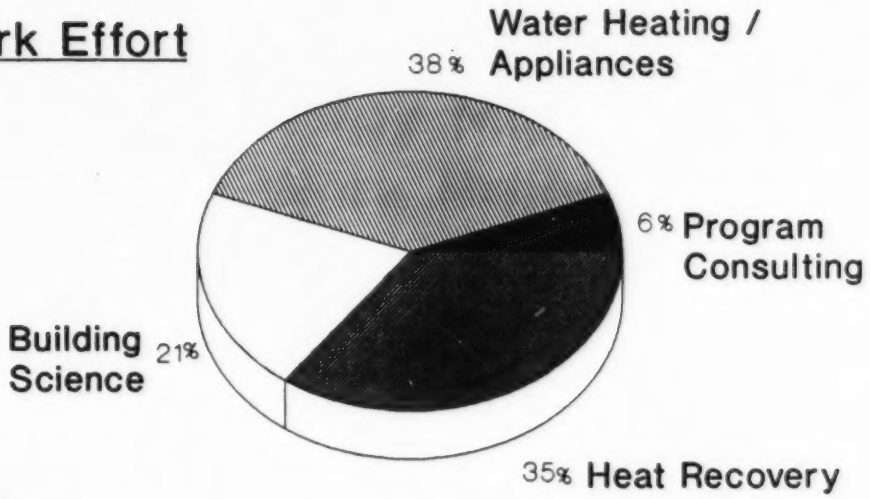
UNIT 2

OHRD Utilization Section

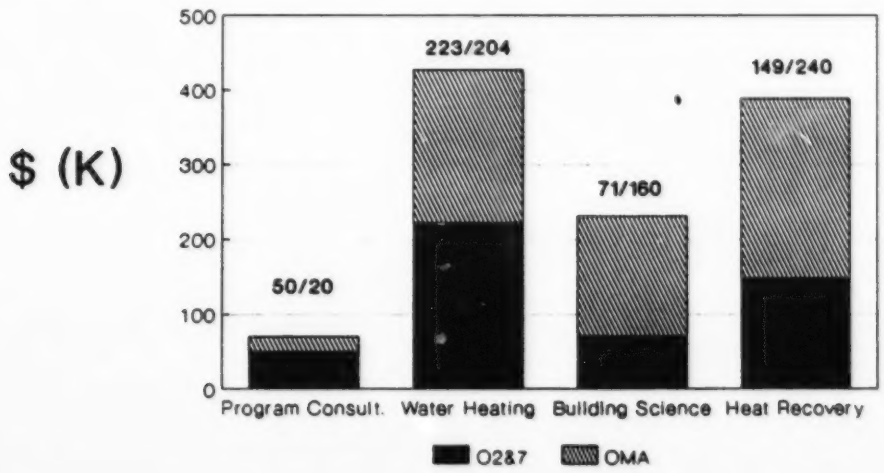
Unit 2 - Energy Management 1990 Work Programs

Total Budget $ 1,117,000

Work Effort



Funding



1990 Work Program and Deliverables

Unit 2: Energy Management ($1117 K)

TITLE	DELIVERABLE	RESPONSIBILITY
1. Program Consulting ($70 K)	• technical rules to support programs	
	• trouble shooting	
	• quarterly reports	M. Perlman
	• year-end report	M. Perlman
2. Advanced Water Heating and Appliances ($427 K)	• high temperature water heater - lab evaluation and report (including new insulation)	C. McGugan
	• Continue development of WH Test Facility	C. McGugan
	• Lab simulator - Water Heater (including liquid crystal temperature visualization)	C. McGugan
	• Legionella - maintain expertise	C. McGugan
	• Reports on - pressureless tank	C. McGugan
	- Duron (plastic inner tank)	C. McGugan
	- 3-element tank	C. McGugan
	- 2 anodes, double glazing	C. McGugan
	- showerhead restrictors	C. McGugan
	- automatic infra-red faucets	C. McGugan
	• Water Heater installation standard	C. McGugan
	• Water Heater product standard	C. McGugan
	• Demand management sizing of water heater - ASHRAE article	M. Perlman
	• School Ice Storage - monitor and report	G. Moore
	• High Efficiency Appliances - SOA Report (includes new regulations)	W.R. Jones

TITLE	DELIVERABLE	RESPONSIBILITY
	- establish appliance test facility (including standard household and combination appliances)	W.R. Jones (with M. Wong)
	- Furnace blower efficiency (preliminary report)	W.R. Jones
3. Building Science ($231 K)	• 1000-house survey - phase 1 - final report	W.R. Jones
	- ACEEE paper	
	• Window test facility - establishment of facility	W.R. Jones
	including - simulation/testing facility	
	- design optimization	
	- advanced technologies (ie, electrochromic, aerogel)	
	• Ventilation - paper	W.R. Jones
	- interim test room operational report	M. Wong (with WRJ)
	• Small Duct Retrofit - report	W.R. Jones
	• Load Shaper program (energy by design) - report on Koolfire	M. Wong (with WRJ)
	- report on ambient free cool	
4. Heat Recovery ($389 K)	• C&D laundry - interim report	G. Moore
	• Heat recovery opportunities - SOA report	G. Moore
	• Residential exhaust air ventilation heat recovery water heating	C. McGugan
	- lab test & report	
	- field trial started	
	• Electrical generation from waste heat	M. Perlman
	- ORMAT - report re applications (CEA)	
	- MHD - preliminary evaluation	
	• Heat Recovery Lab facility - establishment	G. Moore

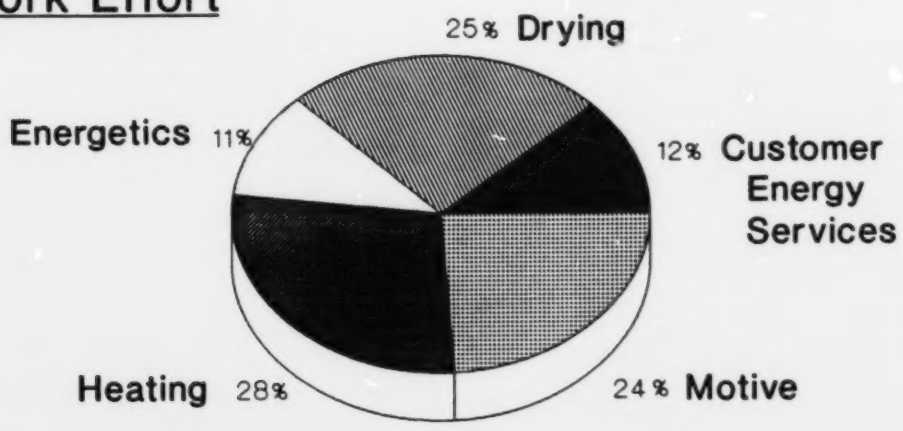
UNIT 3

OHRD Utilization Section

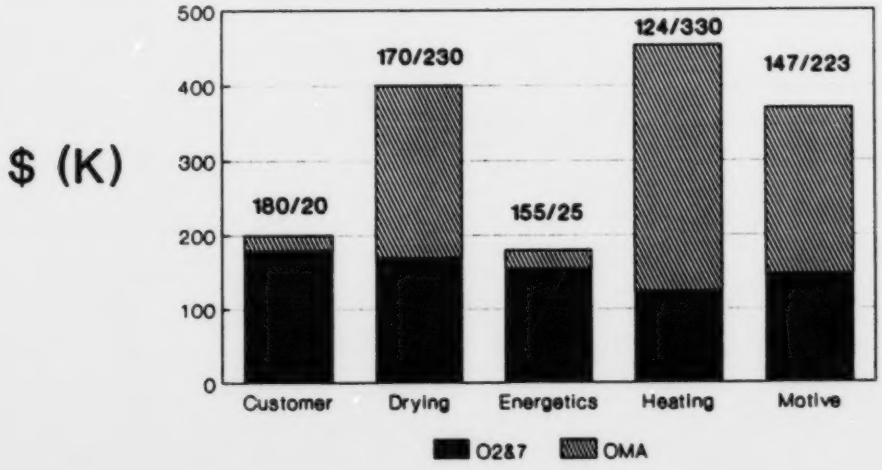
Unit 3 - Process Applications
1990 Work Programs

Total Budget $ 1,604,000

Work Effort



Funding



1990 Work Program and Deliverables

Unit 3: Process Applications ($1604 K)

TITLE	DELIVERABLE	RESPONSIBILITY
1. Customer Energy Services ($200 K)	• ~20 assessments on demand reduction opportunities in industry	J.T. Strack - Unit
2. Drying, Curing, Concentrating ($400 K)	• Softwood dehumid control prototype constructed, tested and report issued	A.T. Chow
	• Infrasound feasibility report issued (with Brown Univ - Richardson)	B.G. Woods
	• Infrasound test facilities commissioned 1. for measuring heat loss 2. new infrasound source for lab	B.G. Woods
	• Small MVR feasibility report issued (for CEA)	D.J. Stevens
	• Opportunity report - Curing (CANETA)	S.J. Oda
	• Opportunity report - Drying (CANETA)	S.J. Oda
	• Hybrid test facility commissioned (hot air and radiofrequency) and demonstration conducted - report issued	B.G. Woods
	• Superheated steam loop assembly completed	D.J. Stevens
	• Progress Report on field demonstration of variable volume fans for batch drying (with Forintek)	A.T. Chow
3. Energetics ($180 K)	• Off-peak charging for lift truck batteries - report(s) (based on lab & field trials)	C.E. Keyes
	• Efficiency of Battery Chargers (with Ryerson - Cheung) - report	C.E. Keyes
	• Zebra mussel control - report on direct electrical control technologies including design data (feasibility report by July)	S.R. McKay (J.T. Strack)

TITLE	DELIVERABLE	RESPONSIBILITY
4. Heating ($454 K)	• Opportunity Report Heat Recovery (with CANETA)	S.J. Oda
	• Opportunity Report - Non-metallic Heating (with CANETA)	S.J. Oda
	• Electric Stimulation of Meat - report (for I&P/EMB)	A.T. Chow
	• Demonstration of Infrasound for demand reduction using new facility - report	B.G. Woods
	• Ceramic kiln - progress report (CEA)	I.S. Balbaa
	• Surge arrestor bonding - wrap-up report	I.S. Balbaa
	• Design of Slotted Waveguides - report on fundamentals	S.J. Oda
	• Industrial Electric Furnace Efficiency - opportunity forimprovement - report - field measuring technique - progress report	I.S. Balbaa
	• Reactivation of carbon by microwave - report (for CANMET)	S.J. Oda (with I.S. Balbaa)
	• Carbon filter recycling for Nuclear generating stations - report (for Central Prod. Serv.)	S.J. Oda
	• Removal of Solvent from Activated Carbon using Microwaves (for Ontario Waste Management Corporation)	S.J. Oda
	• Volume reduction of ion exchange resins - report	S.J. Oda
	• Report on lab and Field demo of NGS sludge drying - 45 gal (for BNGS/Central Prod. Serv.)	S.J. Oda
	• Progress Report on feasibility of de-watering 3 cubic meter containers of sludge from NGSs (for Central Production Services)	S.J. Oda
5. Motive ($370 K)	• Electric end use study - report (Industrial) (with CANETA)	B.G. Woods
	• Fractional motor test facility - preliminary tests and report	S.R. McKay (with C.E. Keyes)
	• Report on effect of rewinding on motor efficiency	C.E. Keyes
	• Report on Demand-Management opportunities in compressed air systems	D.J. Stevens